

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

MIZUNO, et al.

Serial No: 09/670,917

Filed: September 29, 2000

For: Semiconductor Device manufacturing  
Method and Apparatus for Removing  
Silicon Nitride Formed in a Reaction  
Container (As Amended)

Art Unit: 2822

Examiner: GUERRERO, M.

**DECLARATION UNDER 37 CFR § 1.132**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

We the inventors of the above-identified patent application hereby make the following declaration:

Fig. 4 of the present application shows a comparison data obtained by measuring a film contraction ration of each of a silicon nitride film formed using BTBAS and NH<sub>3</sub> and a general silicon nitride film formed using SiH<sub>2</sub>C<sub>12</sub>(DCS) and NH<sub>3</sub>. The data shows that a film contraction ratio of the silicon nitride film formed using BTBAS and NH<sub>3</sub> is about nine times greater than a film contraction ratio of the silicon nitride film formed using SiH<sub>2</sub>C<sub>12</sub>(DCS) and NH<sub>3</sub> (See page 2, line 11 to page 3, line 9 of the specification). The data was obtained by the present inventors and the data is true.


Fig. 5 of the present application shows a comparison data obtained by measuring a film stress of each of a silicon nitride film formed using BTBAS and NH<sub>3</sub> and a general silicon nitride film formed using SiH<sub>2</sub>C<sub>12</sub>(DCS) and NH<sub>3</sub>. The

data shows that a film stress of the silicon nitride film formed using BTBAS and  $\text{NH}_3$  is about two times greater than a film stress of the silicon nitride film formed using  $\text{SiH}_2\text{Cl}_2$ (DCS) and  $\text{NH}_3$  (See page 2, line 11 to page 3, line 9 of the specification). The data was obtained by the present inventors and the data is true.

Fig. 7 of the present application shows an experimental data obtained by measuring particles in a reaction container every film formation, wherein a  $\text{Si}_3\text{N}_4$  film having a film thickness of 1000 Å is formed every film formation step,  $\text{NF}_3$  cleaning is performed before a film thickness of a  $\text{Si}_3\text{N}_4$  film formed in the reaction container reaches 4,000 Å, specifically, the  $\text{NF}_3$  cleaning is performed whenever the film thickness of the formed  $\text{Si}_3\text{N}_4$  film reaches 3000 Å, and the  $\text{Si}_3\text{N}_4$  films are formed 100 times successively. The data shows that after carrying out the  $\text{Si}_3\text{N}_4$  film formation 100 times successively, particle generation is extremely suppressed (See page 14, line 13 to page 15, line 6 of the specification). The experiment was performed by the present inventors and the data and the above statement is true.

We declare under penalty of perjury that the foregoing is true and correct.

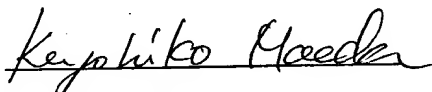
Inventor's Signature



Norikazu Mizuno

Date July 22nd, 2004

Inventor's Signature



Kiyohiko Maeda

Date July 27th, 2004